

*MONARDELLA BENEOLENS* (LAMIACEAE), A NEW  
SPECIES FROM THE CREST OF THE SOUTHERN  
SIERRA NEVADA, CALIFORNIA

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ABSTRACT

*Monardella beneolens*, a new species from the crest of the southern Sierra Nevada in Inyo, Kern, and Tulare counties, California, is described and illustrated. The new species is ecologically and morphologically closest to *M. cinerea* of subalpine and alpine habitats in the San Gabriel Mountains, Los Angeles and San Bernardino counties, southern California. The subsessile, ovate, undulate-cripsed leaves; abundant short-stalked glandular hairs on the leaves, bracts, and calyces; and longer spreading eglandular hairs throughout collectively distinguish *M. beneolens* from all other species of *Monardella*.

The existence of this distinctive, sweet-smelling *Monardella* first came to the authors' attention in June 1986 during a botanical collecting expedition to Owens Peak. A subsequent search of *Monardella* collections at CAS, DS, JEPS, RSA, UC, and UCSB revealed five collections of comparable material, labelled as *M. odoratissima* Benth. subsp. *parvifolia* (E. Greene) Epling. Among these was an undetermined vegetative specimen collected by C. A. Purpus in July 1896 on Olancho Peak that represents the first collection of this new species. It was later collected at Olancho Peak in 1950 by J. T. Howell and in 1975 by James Tatum, who was doing a flora of the peak for his master's thesis (Tatum 1979). Clare Hardham, a student of *Monardella* and author of several endemic California species in this genus, annotated Howell's collections as an "undescribed species" in 1975. She was never able to study mature material and consequently did not formally describe the species.

*Monardella beneolens* Shevock, Ertter, & Jokerst, sp. nov. (Fig. 1).—

TYPE: USA, California, Kern Co., near the summit of Owens

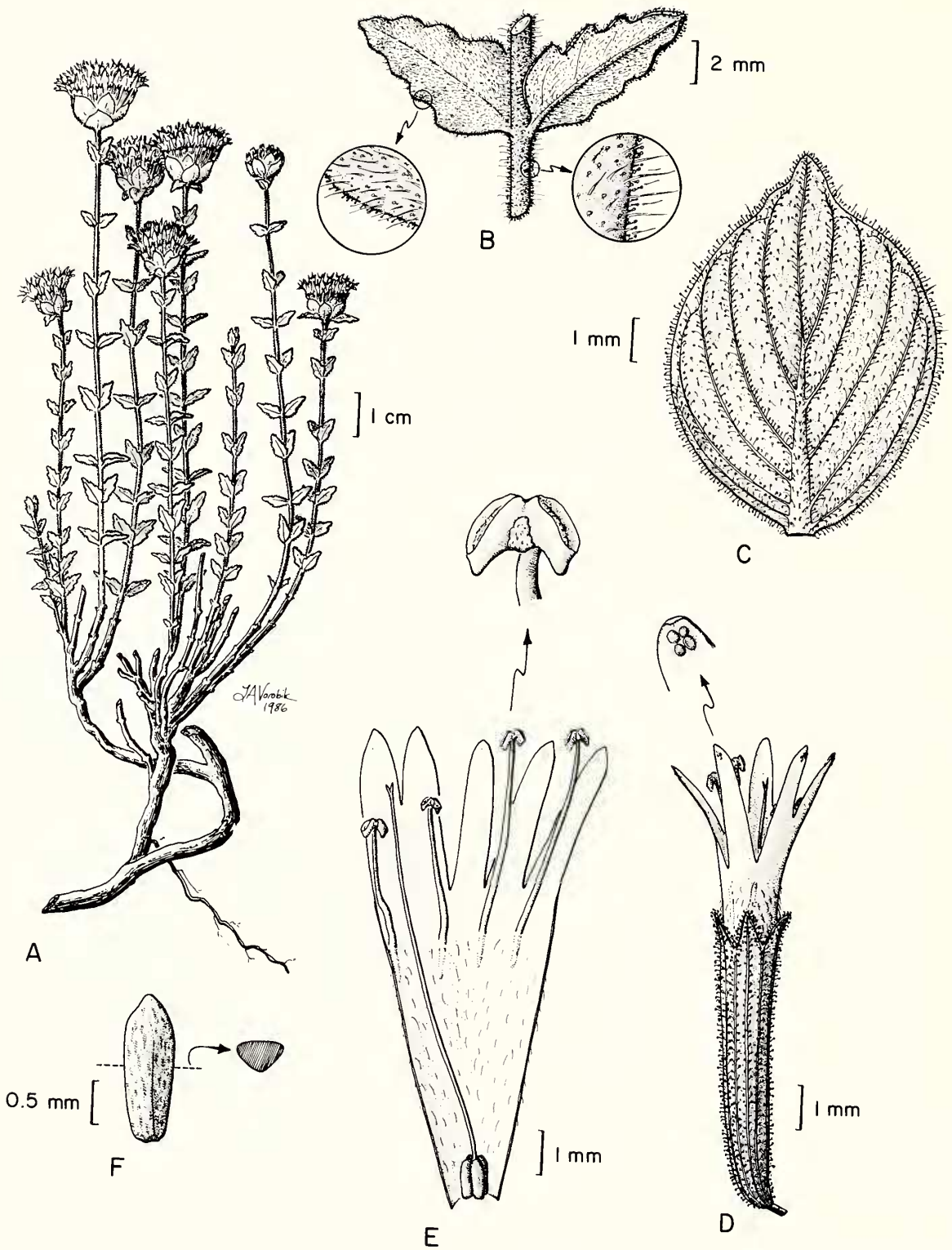


FIG. 1. *Monardella beneolens*.—A, habit; B, leaves with close-up of vestiture; C, outer leafy verticillaster bract; D, flower with glandular droplets at corolla tip; E, internal structure of corolla with enlargement of anther; F, nutlet with cross-section.

Peak on granitic and metamorphic scree and bedrock, open mixed conifer forest, eastern slope below the Sierran crest, T26S R37E sect. 21, 8200 ft. (2500 m), 13 Jul 1986, *Shevock, Bartel, and York 11727* (holotype: CAS; isotopies: FSC, MO, NY, RSA, UC).

Ab aliis *Monardella* combinatione habitu laxe rhizomatosa, glandulis abundis stipitatus trichomatibus villosis, foliis ovatis sessilibus crenatis undulatis distinguenda.

Mat-forming, loosely rhizomatous perennial, vestiture a mixture of abundant fine glandular hairs  $\pm 0.1$  mm long and spreading non-glandular hairs  $\pm 1$  mm long. Stems erect, 0.7–3 dm high, sometimes branched above, villous, bark light brown below and green above. Leaves 5–13 pairs per stem, short petiolate to nearly sessile, those near the ground largest; blades ovate, densely hairy on both surfaces, margin undulate,  $\pm$  crenate, 7–15 mm long and 2–10 mm wide. Verticillaster (head), solitary or occasionally with 1–2 additional heads in distinct whorls below, or in a panicle. Verticillaster bracts in three sets: outer set 2 pairs, 6–9 mm long, 4–7 mm wide, ovate, acute, scarious or the outer pair leaflike or leafy-tipped with green, undulate margins, scarious portions occasionally rose or lavender, closely subtending head or the outer pair 1–5(–8) mm distant; middle set of bracts 2–3 pairs, lance-ovate, scarious, rose to lavender aging to straw-colored; inner set of bracts 0–3(–5), lanceolate or acicular, scarious. Calyx 6–8 mm long, sparsely to moderately hairy with short and long glandular hairs, 13–15 veined; lobes triangular-acute, margins glandular-ciliate with hairs to 0.5 mm long. Corolla 9–11 mm long, tube exerted from calyx  $\frac{1}{6}$  to  $\frac{1}{8}$  its total length, lavender to pale rose, sparsely pilose within and more densely so without; lobes tipped with gold colored glandular droplets, upper lip cleft  $\frac{1}{2}$  its length; stamens unequal, with lower pair equal to or exceeding the corolla lobes and upper pair shorter than corolla lobes, filaments attached near or below the middle of the corolla; pistils shorter than the stamens, stigma branches  $< 1$  mm long; nutlets 1.5–2.0 mm long, triangular-ovate in cross section, light brown with black mottling. Chromosome number  $n=21$ .

*Paratypes*: USA, California, Kern Co., type locality, 2500 m, 11 Jun 1986, *Ertter, Daniel, and Bagley 6443* (UC); 8 Sep 1987, *Shevock and Jokerst 11812* (CAS, RSA, UC). Tulare Co., Olancha Peak, W slope of summit at base of granitic boulders above foxtail pine forest, T19S R36E sect. 19 NE $\frac{1}{4}$  SW $\frac{1}{4}$ , 11,600 ft (3530 m), 22 Jul 1950, *Howell 27202* (CAS); Olancha Peak, Jul 1896, *Purpus 1866* (UC). Inyo Co., Olancha Peak, southern saddle at timberline, T19S R36E sect. 19, 10 Sep 1986, 10,700 ft (3260 m), *Shevock 11771* (CAS, FSC, MO, NY, RSA, UC); SE shoulder of Olancha Peak, 3402 m, 29 Jul 1975, *Tatum 220* (UCSB); S ridge of Olancha Peak, 3353 m, no date, *Tatum 502* (UCSB); Little Cottonwood Creek, 10,200 ft (3110 m), 12 Aug 1949, *Howell 26254* (CAS).

*Distribution, habitat and phenology.* *Monardella beneolens* grows on rocky granitic or metamorphic slopes in open mixed conifer and foxtail pine forests, from 2500 to 3530 m. Plants form extensive

dense mats 1.5 m or more across where rooting substrate consists of rocky scree. Plants in bedrock crevices and ledges are smaller. Flowering extends from July to September, depending on elevation, snowpack duration, and patterns of seasonal aridity.

*Monardella beneolens* is known from only three sites along the southern Sierra Nevada crest: Owens Peak in Kern County, Olancha Peak in Inyo/Tulare counties, and Cottonwood Creek in Inyo County (Fig. 2). Although *M. beneolens* is not associated with a consistent group of species at these three populations, it occurs with a surprisingly high concentration of rare localized southern Sierra Nevada endemics. Noteworthy associates include *Eriogonum wrightii* Torrey ex Benth. var. *olanchense* (J. T. Howell) Rev. and *Trifolium dedeckeriae* G. Gillett at Olancha Peak; while *Erigeron aequifolius* H. M. Hall, *Eriogonum breedlovei* (J. T. Howell) Rev. var. *shevockii* J. T. Howell, *Haplopappus gilmanii* S. F. Blake, *Lomatium shevockii* R. L. Hartman & Constance, and *Raillardella muirii* A. Gray occur at Owens Peak.

*Morphological variation and hybridization.* Populations of *Monardella beneolens* from Olancha and Owens Peak are quite distinct. Olancha Peak material from above timberline, has generally shorter stems, denser villous and glandular hairs, and smaller crisped leaves. This may be a function of climate since Olancha Peak populations occur nearly 770 meters higher in elevation than those on Owens Peak.

Below timberline south of Olancha Peak, possible hybridization with *M. linoides* A. Gray has been observed. The apparent hybrids are taller than *M. beneolens*, with narrower, less crisped leaves, and bracts exceeding the calyces with parallel veins that branch from the midrib near its base. In addition, plants from *Shevock 11762* (along the Pacific Crest Trail S of Olancha Peak) with petiolate leaves, fascicles of undeveloped leaves in the axils, longer internodes, and softly pubescent calyces may be hybrids between *M. beneolens* and *M. odoratissima*, a relative of *M. linoides*. Given the propensity for hybridization in *Monardella*, ecological rather than genetic factors appear to be most responsible for maintaining what distinctions exist among sympatric species (Epling 1925; Hardham 1966; Hardham and Bartel in press).

Owens Peak was selected for the type locality because plants there display the least hybridization of the *M. beneolens* populations known. This contrasts with Clare Hardham's (pers. comm.) belief that the Olancha Peak material is the least hybridized and therefore more suitable as the type.

In our understanding, plants from Owens Peak have traits that could be interpreted as ancestral to the Olancha Peak population while the converse seems less tenable. In addition to exhibiting the

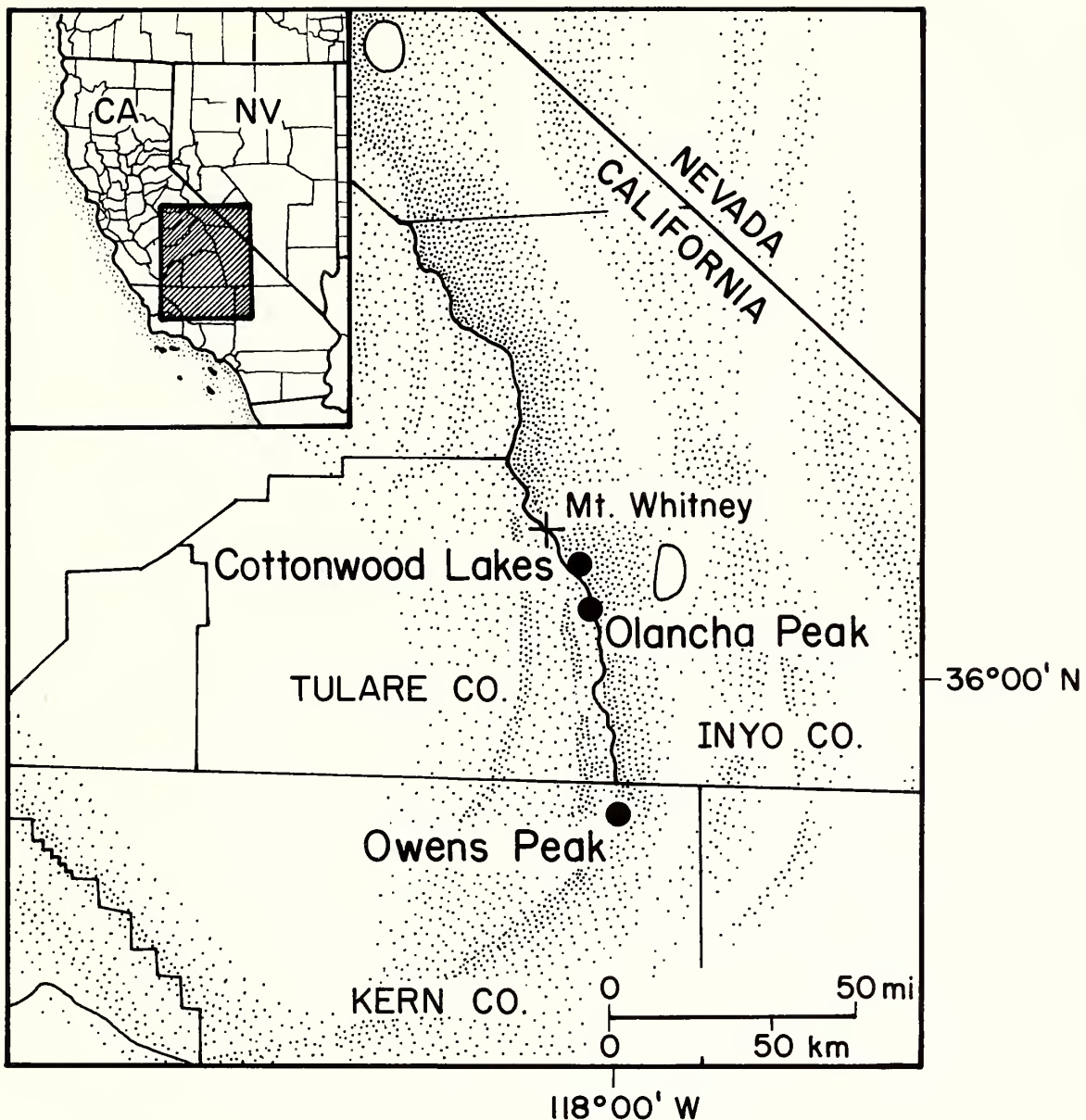


FIG. 2. Distribution of *Monardella beneolens* along the crest of the southern Sierra Nevada in Inyo, Kern, and Tulare counties, California.

fewest traits of other locally occurring species, plants from Owens Peak more closely resemble other geographically restricted *Monardella* from southern California and Arizona. It is likely that *M. beneolens* was historically more widespread and the isolated populations we observe today have since diverged as a result of hybridization and other forces.

*Relationships.* Unlike many species of *Monardella*, which are often not well delimited, *M. beneolens* is so distinct in its combination of openly rhizomatous habit, ovate crenate-undulate leaves, and mixed short glandular and spreading villous vestiture, that determining its relationships is challenging. The existence of putative hybrids with sympatric *Monardella* could lead one to conclude that *M. beneolens* is closely related to *M. linoides* and *M. odoratissima*. These latter

TABLE 1. CHARACTERS USED TO DIFFERENTIATE *MONARDELLA BENEOLENS* AND OTHER CLOSELY RELATED SPECIES.

	<i>M. BENEOLENS</i>	<i>M. CINEREA</i>	<i>M. ARIZONICA</i>
Leaves			
Attachment	sessile	sessile to short-petiolate	sessile to minutely petiolate
Blade shape	triangular-ovate	ovate to triangular-ovate	linear to oblong-lanceolate
Base shape	rounded-obtuse to $\pm$ cordate	rounded-obtuse to $\pm$ cordate	rounded-acute
Apex shape	sharp acute	sharp acute	rounded-acute
Margin	$\pm$ toothed, undulate	$\pm$ toothed, faint undulate in some	entire and plane
Vestiture types	1) moderately dense, non-glandular hairs 2) moderately dense, glandular hairs with tip $2 \times$ width of stalk 3) stalked, gold-colored, glandular droplets	1) dense, non-glandular hairs 2) dense glandular hairs with tip $<$ $1.5 \times$ width of stalk 3) sessile, gold-colored, glandular droplets matted on underside	1) dense, non-glandular hairs 2) dense glandular hairs with tip $2 \times$ width of stalk, these concealing the lower leaf surface 3) stalked, gold-colored glandular droplets
Bract			
Habit	involute and overlapping thus concealing calyx bases; outer spreading in some	weakly involucrate or not overlapping, only partially concealing calyx bases; outer reflexed in some	narrow, not involucrate or concealing calyx base; outer reflexed
Shape	ovate, acute	ovate, acute	broadly lanceolate, acute
Venation	parallel pinnate	parallel pinnate to dendritic	parallel pinnate
Texture	outer leaflike in some, remainder scariosus	outer scariosus to leaflike, remainder scariosus	outer leaflike, remainder scariosus
Color at anthesis	straw to rose	purple to red	green to straw
Color after anthesis	straw	purple to red	straw

TABLE 1. CONTINUED.

	<i>M. BENEOLENS</i>	<i>M. CINEREA</i>	<i>M. ARIZONICA</i>
Corolla			
Tube exertion from calyx	1/6 to 1/8 the length of corolla tube	tube not exerted	± 1/4 the length of corolla tube
Gland at apex	yes	no	yes
Color	lavender to pale rose	pale lavender	white to occasionally rose tinged
Calyx			
Vestiture	dense amounts of long & short glandular hairs	scant amounts of hairs	scant to moderate amounts of glandular and eglandular hairs
Lobes shape	triangular acute	long acuminate	long acute
Lobes margin	glandular ciliate from hairs originating on raised "berm" of tissue on outer edge of lobes	glandular ciliate from hairs originating on raised "berm" of tissue on outer edge of lobes	appearing ciliate but hairs originating on inner surface of calyx
Inflorescence	heads solitary, racemose or paniculate	heads solitary or occasionally racemose	heads solitary or paniculate
Habit	low, rhizomatous, spreading, mat-forming	low, rhizomatous, spreading, mat-forming	upright sub-shrub, branched above, woody at base
Habitat Range	alpine-subalpine Owens Peak, Olancha Peak, to Little Cottonwood Creek, eastern edge of southern Sierran Crest, Kern, Inyo, and Tulare counties, CA	alpine-subalpine highest peaks of San Gabriel Mtns., Los Angeles and San Bernardino counties, CA	desert montane Maricopa, Mojave, Pima, Yavapai, and Yuma counties, AZ

two species, however, are morphologically very distinct from *M. beneolens* in their more tightly clumped habit; absent or inconspicuous tightly appressed non-glandular vestiture; and narrow, petiole-late, punctate leaves.

Instead, the most similar species is *M. cinerea* Abrams, from subalpine and alpine habitats in the San Gabriel Mountains of southern California. Both geographically restricted species form openly rhizomatous mats in scree and have subsessile ovate leaves, but *M. cinerea* lacks the undulate leaf margins and some vestiture characteristics of *M. beneolens* (Table 1). Habit, vestiture, leaf and inflorescence characteristics also allow a comparison with *M. arizonica* Epling, an endemic of Arizona desert ranges, as summarized in Table 1.

*Monardella beneolens* also has striking similarities in vestiture, leaf form, and habit with two coastal dune species of central California which have been called *M. crispa* Elmer and *M. undulata* Benth. var. *frutescens* Hoover (Hoover 1949; Munz 1968; Smith 1976). *Monardella beneolens* and these dune taxa share scarious lavender to rose colored bracts and undulate leaf margins. They flourish on unconsolidated, shifting mineral substrates and one coastal form has a low, rhizomatous mat-forming habit. Although *M. beneolens* and the dune taxa are geographically and elevationally widely separated, their shared morphological traits are nonetheless intriguing.

Two other geographically restricted species that share spreading glandular and eglandular villous hairs in flowering heads and characteristics of bract texture and arrangement are *Monardella robisonii* Epling in Munz and an undescribed *Monardella* (Hardham and Bartel submitted for publ.). These numerous possible relatives argue against assigning other than tentative relationships without conducting a broader and more detailed survey of *Monardella* species.

*Rarity status.* *Monardella beneolens* is highly restricted within its narrow range, occurring at three small, discrete populations along the crest of the southern Sierra Nevada. All reported populations occur on federal lands administered by either the Bureau of Land Management-California Desert Conservation Area or the United States Forest Service-Inyo National Forest. Due to the limited access and extremely arid and rugged terrain, this rare endemic is not likely to be adversely impacted by humans. Two of the populations are within the Golden Trout Wilderness, and the Owens Peak occurrence is in an area being recommended to Congress for wilderness designation by the BLM. We anticipate that more populations will be discovered as field work continues along the rugged, isolated crest of the southern Sierra Nevada.



## ACKNOWLEDGMENTS

We thank Clare Hardham for her insights into the genus, and our colleagues Mark Bagley, Steve Boyd, Dave Bramlet, Ginny Dains, Tom Daniel, Bob Holland, Dale McNeal, Jim Morefield, and Larry Norris who made the 1986 First Inter-Institutional Haybaling Expedition a success. Special thanks go to Geraldine Allen for securing the chromosome count. We are also most appreciative for the excellent illustration provided by Linda Vorobik. The authors also thank the reviewers for ways to improve the manuscript.

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(Received 30 Jan 1989; revision accepted 28 Aug 1989.)

## ANNOUNCEMENT

## THIRTEENTH GRADUATE STUDENT MEETINGS

The California Botanical Society will sponsor the Thirteenth Graduate Student Meetings on Saturday, 17 March 1990, hosted by the Rancho Santa Ana Botanic Garden. Presentations will take place in the Albrecht Auditorium on the Claremont Graduate School campus.

The presentations of proposed research, research in progress, and finished research will promote exchange of ideas and information among the graduate student community. Awards in each category will be given at a banquet following the talks. All member and non-member graduate students pursuing research in plant science are invited to participate. Students not giving a paper, but with prior presentation experience, may participate as awards judges.

Abstracts are due on 20 February 1990. For further registration information contact James D. Morefield, Graduate Student Representative, Rancho Santa Ana Botanic Garden, 1500 N. College Ave., Claremont, CA 91711-3101.